Production of White Potato Flour and Meal

Because of the wide public interest in the production of white potato flour or meal arising from the announcement on July 1, 1948, that the Commodity Credit Corporation would require 200,000 tons of this product for export, numerous inquiries have been received as to how these products can be made by other than the conventional method. AIC-190 entitled "Utilization of Idle Equipment in Distilleries for Production of White Potato Flour" issued June 1948 describes one of several possible methods. Other processes are under experimental study at the Eastern Regional Research Laboratory and it is planned to publish an AIC circular describing these methods and giving cost estimates. However, it will not be possible to issue this detailed information for several months as the experimental work is not yet completed. In view of the immediate demand for such information as is available this communication is now issued.

Process 1: One method, the basic principles of which have been successfully used on a commercial scale and which has also been studied experimentally at this Laboratory, is as follows: The potatoes are thoroughly washed and inspected to remove spoiled parts. They are then ground in a hammer mill using thin hammers (about 1/16" thick) and equipped with a screen having 1/2" diameter holes. Sulphur dioxide is introduced into the slurry (.125% on the basis of the potatoes) and it is then pressed to a moisture content of about 56%. This can be accomplished with a batch-type cider press capable of developing pressures up to 200 p.s.i. It is doubtful, however, that so low a moisture could be achieved with continuous rotary presses unless repeated repressings were done.

The pressed cake is broken up in any simple type of shredder, such as a pomace picker, and then fed to a rotary steam tube dryer. The granular product from the dryer is then ground in a hammer mill and screened to produce either a flour or meal. With this type of product a steam tube dryer should evaporate approximately 1.5 pounds of water per hour per square foot of tube surface.

The chief advantage of pressing is the increased dryer capacity that results from the elimination of over half of the water content of the potato. The disadvantages are that up to 20% of the dry potato solids may be lost in the press liquors and the liquors constitute a disposal problem in some areas.

Process 2: Because of the disadvantages of pressing, attempts have been made to dry the ground product containing SO_2 without pressing. Preliminary experiments on a pilot-plant scale have shown that the unpressed product can be dried in a steam tube dryer by recycling sufficient dried product with the ground potatoes so that the material fed to the dryer contains not more than 45% moisture. This lower moisture content is required because the unpressed product contains more of substances conducive to sticking than the pressed product. Preliminary indications are that a product of satisfactory quality can be obtained by this method but sufficient data are not now available to recommend its adoption. The dried product is ground and screened as in Process 1.

Process 3: Although we are not aware of its having been done commercially, nor has any experimental work been done at this Laboratory, it is theoretically possible to dry the ground potatoes (after treating with SO_2 and pressing) in a direct heat, high temperature rotary dryer. With this type of dryer it is not necessary to press to as low a moisture content as required with the steam tube dryer. The maximum moisture to prevent sticking is not known, but is probably somewhere around 70% depending in part on dryer design. It is possible to press to 70% moisture in continuous rotary type presses with 2 or 3 successive pressings, depending upon the variety and age of the potatoes. The same amount of SO_2 is used as in Process 1 and the dried product would be similarly ground and screened.

Besides the obvious disadvantages of pressing, this method entails a fire hazard in the dryer because of the large amount of potato starch that may come in contact with open flames.

Process 4: As in Process 2 it is theoretically possible to substitute recycling of the dried product for pressing in order to achieve a low enough moisture content in the feed going to the dryer to prevent sticking. What the moisture content should be in this case is not known. We do not know of this method having been tried.

Process 5: From a survey of European practice on potato processing it was learned that uniformly sliced potatoes could be dried in direct heat rotary dryers to produce a product suitable for human consumption. This was done by coating the slices with a thin layer of potato meal to prevent sticking to the dryer. The inlet gas temperature was maintained between 600 and 700°F. and the outlet temperature at about 175°F. The dryer was rotated at between 3 and 4 R.P.M. The resulting product after soaking was cooked in the field and used for military rations.

Some modification of this procedure might be used to produce potato flour or meal. Pilot-plant experiments will be carried out at the Eastern Regional Research Laboratory as soon as a direct heat dryer is available--probably in October. It is very important that the potatoes be uniformly cut. This can be accomplished with any one of a number of vegetable slicers. The slices should be approximately 1/8" in cross section. These could be handled as strips or using the appropriate attachment on the cutter they could be diced. In order to maintain the color they would have to be treated with sulphur dioxide which might be done by introducing the gas into a screw feeding device to the dryer. The use of a sulfite solution to wash the slices would be undesirable as the extra water introduced would carry away with it some starch from the surface of the slices. Before the SO_2-treated slices enter the dryer they may have to be coated with a thin layer of dried potato meal. Experiments made at this Laboratory show that the meal should be of a size to pass through 1/16" holes and be held on a 35 mesh screen (holes .0164 inch diameter). The finished product would have to be ground and screened to produce meal or flour.

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